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Title: Myth and Catastrophic Reality: Using Cosmogonic
Mythology to identify cosmic Impacts and Massive Plinian
Eruptions in Holocene South America

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Florence, Italy



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**MYTH AND CATASTROPHIC REALITY:
USING COSMOGONIC MYTHOLOGY TO IDENTIFY COSMIC IMPACTS
AND MASSIVE PLINIAN ERUPTIONS IN HOLOCENE SOUTH AMERICA***

W. Bruce Masse¹ and Michael J. Masse²

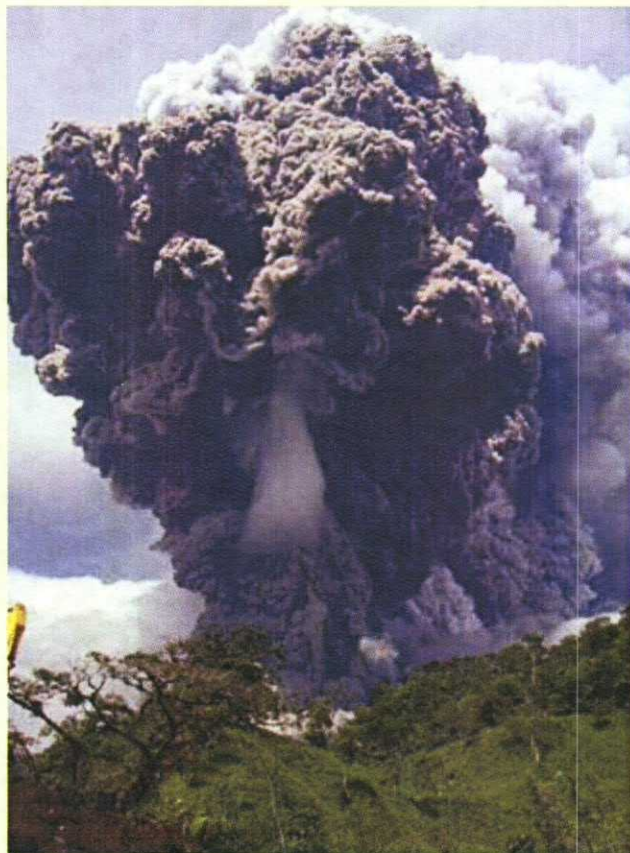
¹*Los Alamos National Laboratory*

²*Scripps Memorial Hospital*

Major natural catastrophes (e.g., “universal” floods, fire, darkness, and sky falling down) are prominently reflected in traditional South American creation myths, cosmology, religion, and worldview. We are now beginning to recognize that cosmogonic myths represent a rich and largely untapped data set concerning the most dramatic natural events and processes experienced by each cultural group during the past several thousand years. Observational details regarding specific catastrophes are encoded in myth storylines, typically cast in terms of supernatural characters and actions. Not only are the myths amenable to scientific analysis, but also some sets of myths encode multiple catastrophes in meaningful relative chronological order. The present study considers more than 4200 myths, including more than 260 “universal” catastrophe myths from cultural groups throughout South America. These myths are examined in light of available geological, paleoenvironmental, archeological, and documentary evidence. Our analysis reveals three possible ultra-plinian volcanic eruptions, two in Columbia and the other in the Gran Chaco, the latter likely associated with a poorly dated late Holocene eruption of Nuevo Mundo in central Bolivia. Our analysis also identifies a set of traditions likely linked with the well-known Campo del Cielo iron meteorite impact in northern Argentina originally hypothesized to have occurred around 4000 years ago. Intriguingly, these traditions strongly suggest that the Campo del Cielo impact triggered widespread mass fires in the Gran Chaco region and possibly in the Brazilian Highlands. Several other potential cosmic impacts, distinct from Campo del Cielo, are hinted at in the mythology of other locations in South America. The numerous catastrophe myths in the Gran Chaco region exhibit the most coherent chronological sequence of any South American region. The sequence begins with a “Great Flood,” by far the most widespread catastrophe myth in South America, typically represented as the beginning of our modern world. The great flood is followed “many generations” later by the “Great Fire” (hypothesized as the Campo del Cielo impact) with the “Great Darkness” and “sky falling down” (hypothesized as the Nuevo Mundo eruption) being the most recent catastrophe, occurring “many generations” after the great fire. We draw upon the physical record to suggest rough calendrical dates for these witnessed catastrophic events.

***Invited presentation for the symposium, “Myth and Geology,” 32nd International Geological Congress, August 2004, Florence, Italy.**

MYTH AND CATASTROPHIC REALITY:



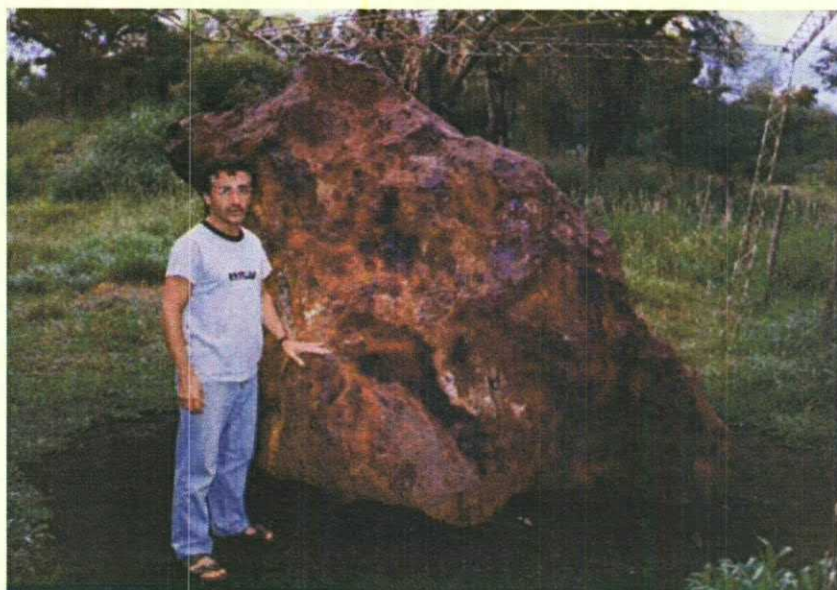
USING
COSMOGONIC
MYTHOLOGY
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IN HOLOCENE
SOUTH AMERICA

W. BRUCE MASSE
&
MICHAEL J. MASSE

Symposium on
MYTH & GEOLOGY

32nd International
Geological Congress

August 2004

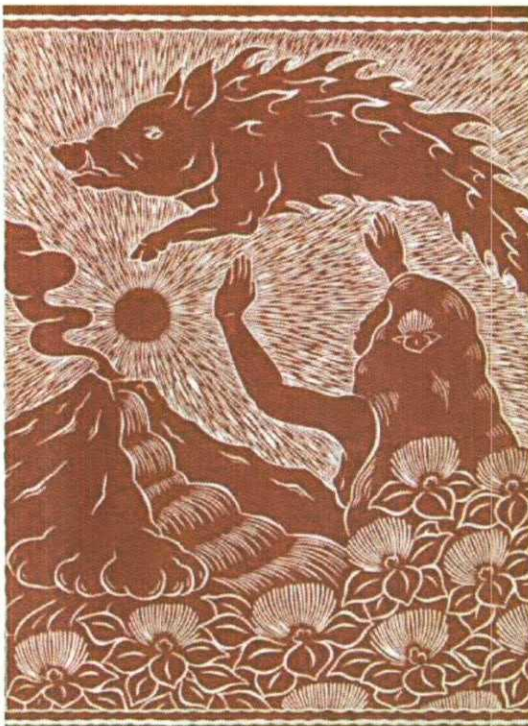


THE 'SCIENTIFIC' VIEW OF MYTHOLOGY

- **U.S. Soil Erosion Rates—Myth and Reality**
[Science]
- **Facts and Myths about Radiopeptide Therapy...**
[European Journal of Nuclear Medicine and Molecular Engineering]
- **Sensory Evaluation: Science and Mythology**
[Food Technology]
- **Mythology and Numerology in the Sphere of Melanoma**
[Cancer]
- **Dispelling a Myth**
[Nature]
- **Ten Turbidite Myths**
[Earth-Science Reviews]
- **Mesozoic Dipole Low: Myth or Reality?**
[Eos, Transactions, American Geophysical Union]
- **The Water Budget Myth Revisited; Why Hydrogeologists Model**
[Ground Water]



Waha'ula temple complex, 22 June 1989



Kamapua'a and Pele



Hawaiian chief



AURORA



LUNAR ECLIPSE



SOLAR ECLIPSE



1799 LEONID METEORS



COMET IKEYA-SEKI

A MENAGERIE OF COMET SHAPES



MRKOS 1957



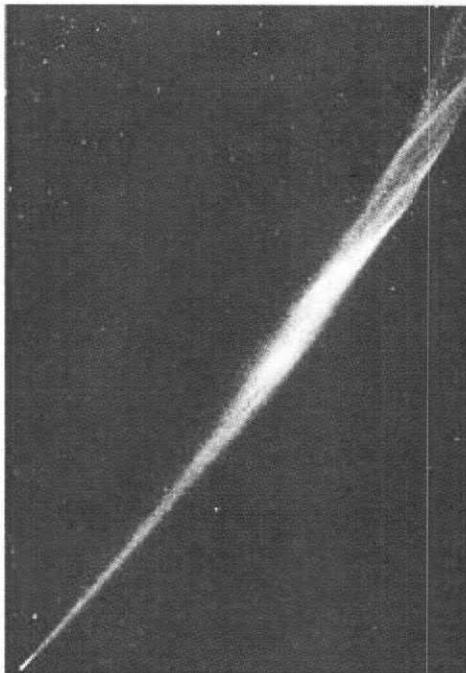
HALLEY 1986



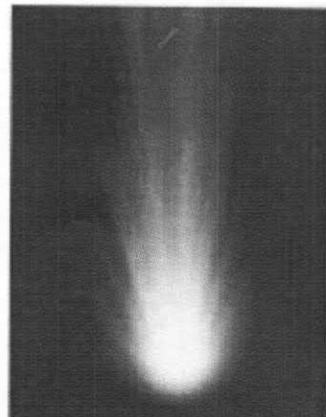
AREND-ROLAND 1957 III



HUMASON 1962 VIII



IKEYA-SEKI 1965



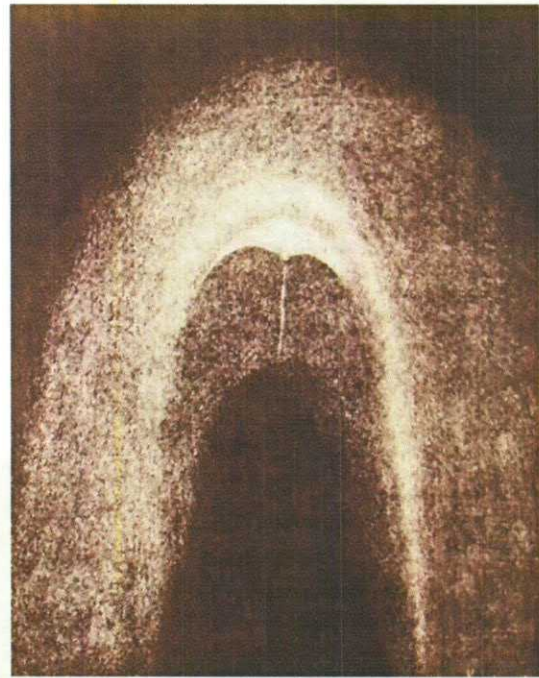
BROOKS 1911

HAWAIIAN GENEALOGICAL CHIEFS AND MYTHS

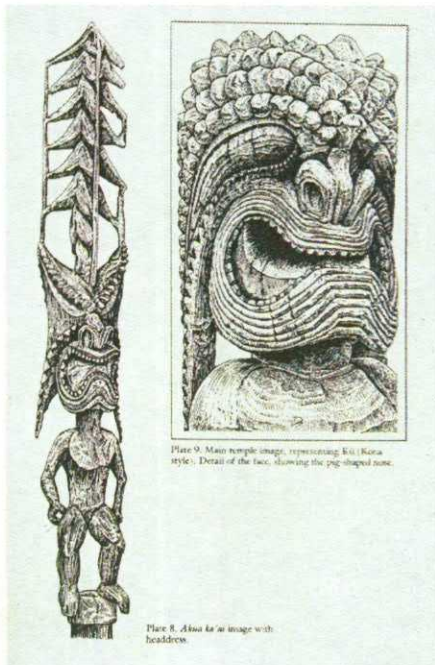
GENEALOGICAL CHIEF PRIOR TO KAMEHAMEHA	SUPERNATURAL MYTH STORYLINE	CELESTIAL OR OTHER NATURAL EVENT AND DATE OF OCCURRENCE
KAKUHIHEWA Generation 6	BATTLE OF THE OWLS AT DAYBREAK ON OAHU ISLAND	OAHU ISLAND SUNRISE TOTAL SOLAR ECLIPSE A.D. 1679
KALAUNUIOHUA Generation 20	SORCERESS CAUSES CLOUDS TO MOVE ERRATICALLY AND TO RAPIDLY CHANGE SHAPE AND COLOR	AURORAL SUBSTORMS A.D. 1370
KANIPAHU Generation 23	BATTLE OF VOLCANO GODDESS PELE AND DEMIGOD KAMAPUA'A	COMET HALLEY AND MAJOR KILAUEA RIFT ERUPTION A.D. 1301
PALENA Generation 32	DEMIGOD KANA RESTORES THE SUN OVER HAWAII ISLAND STOLEN BY CHIEF	TOTAL SOLAR ECLIPSE A.D. 1104
HUA Generation 37	SORCERER RESTORES SUN AND MAKES PATH FOR TINY MENEHUNE	TOTAL SOLAR ECLIPSE; GREAT COMET; METEOR SHOWER A.D. 975
MAUIAKALANA Generation 52	DEMIGOD/CHIEF SNARES SUN BEFORE IT SETS TO HELP DRY HIS MOTHER'S TAPA	SAMOAN SUNSET TOTAL SOLAR ECLIPSE A.D. 761



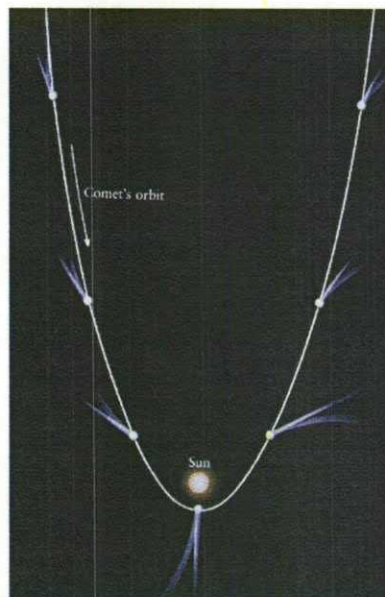
WAR GOD, KU



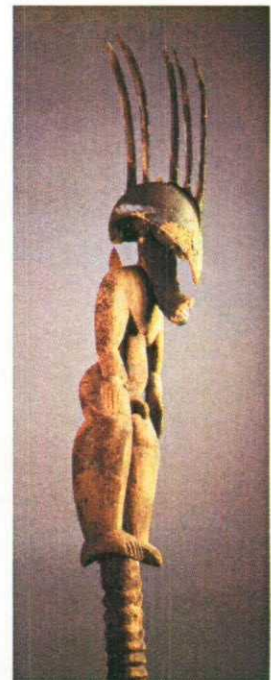
**DRAWING OF NUCLEUS
OF COMET OF 1861**



KU IMAGES



COMET ORBIT



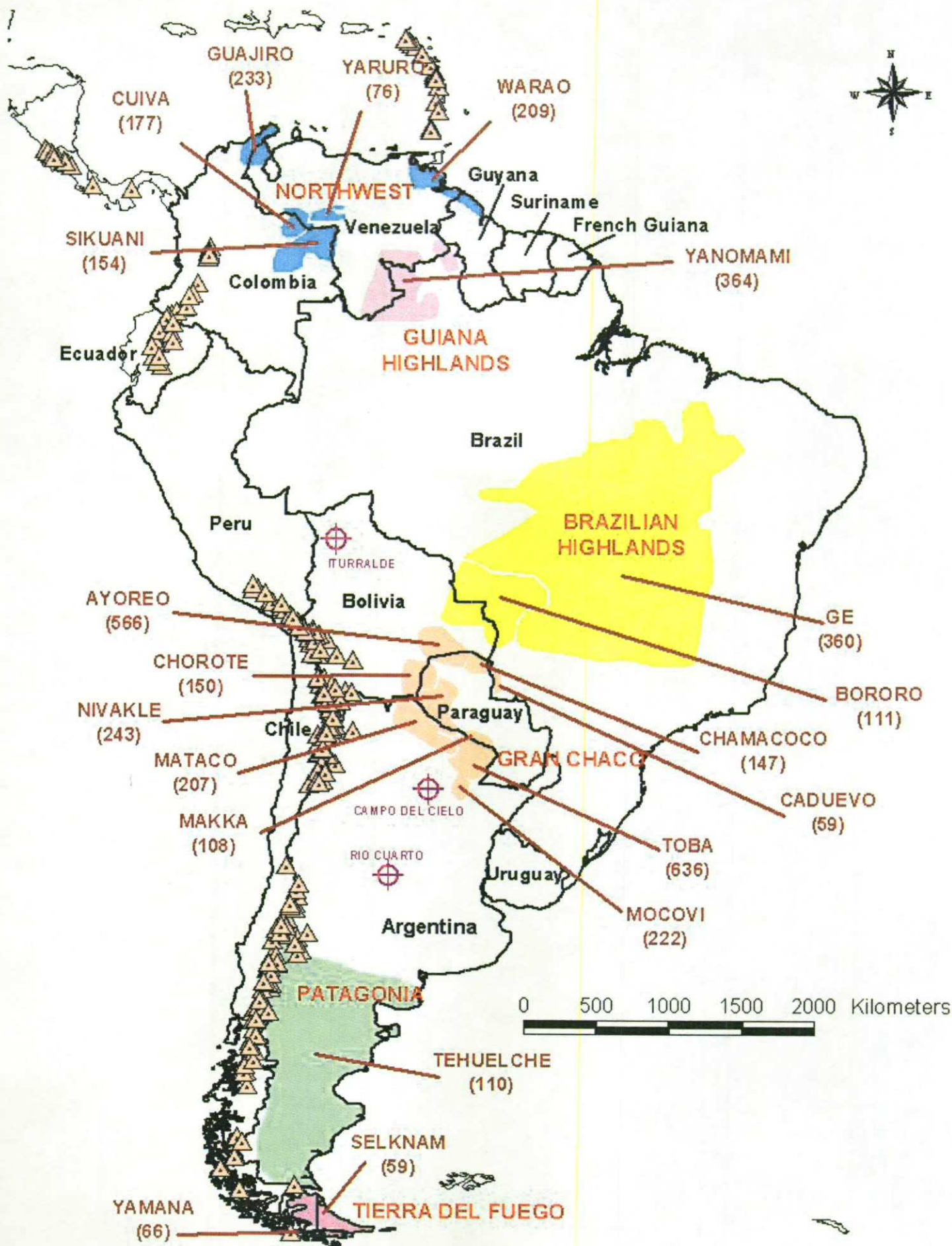
KAMAPUA'A

MYTH DEFINITION:

- **A myth is a specific style of story created by cultural knowledge specialists [e.g., priests or historians] using supernatural images in order to explain otherwise inexplicable natural events or processes.**

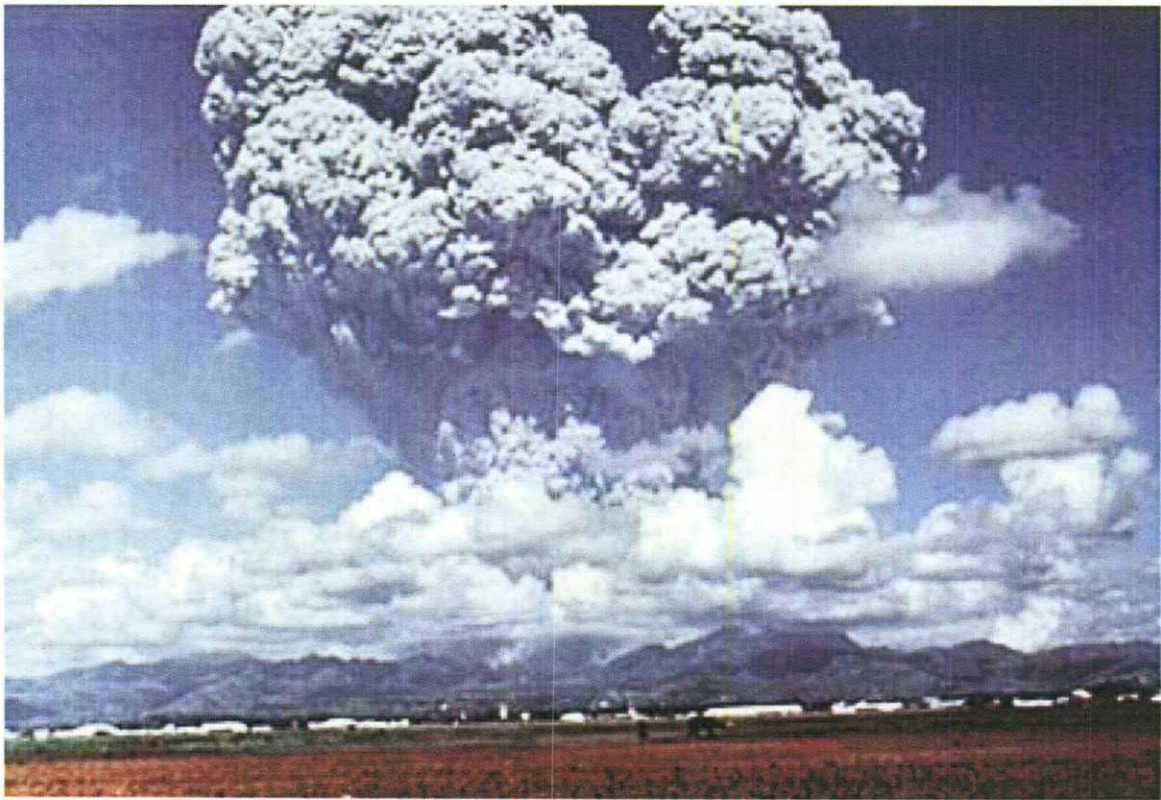
SOME PRINCIPLES:

- 1. Folklore is NOT Myth.**
- 2. The more unusual or striking the natural event or process, the more likely the knowledge specialist will resort to using supernatural elements, such as the creation of demigods.**
- 3. Natural events leading to considerable loss of life for a given cultural group [e.g., floods, fire] become part of the sacred cosmogony or creation mythology for that group, and are typically sequenced in relative historical order.**
- 4. Most traditional cultures had strict institutional mechanisms (e.g., solstice ceremonies, dance, chant) by which orally transmitted sacred knowledge could be preserved largely intact for hundreds or even thousands of years.**



SOUTH AMERICAN CATASTROPHE MYTHS

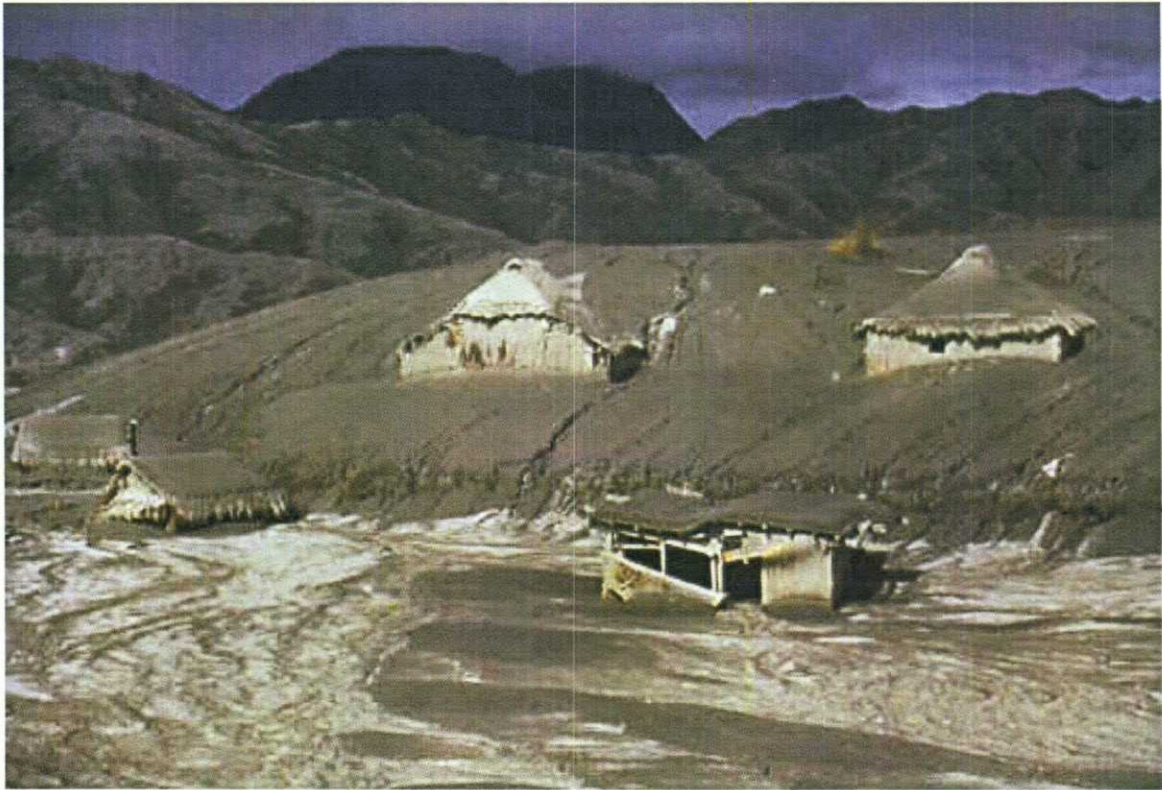
	EARLIEST IN MYTH CYCLE	JUST AFTER FLOOD MYTH	MIDDLE OF MYTH CYCLE	MOST RECENT IN MYTH CYCLE	MOST RECENT IN MYTH CYCLE
	GREAT FLOOD	GREAT COLD	WORLD FIRE	DARKNESS SKY FELL	DARKNESS
AYOREO	17		2		1
BORORO	4		1		
CADUEVO					
CHAMACOCO	10		1	1	
CHOROTE	10		7	1	
CUIVA	13			4	
GE	11		6		1
GUAJIRO	9				1
MAKKA	2				1
MATACO	12		5		1
MOCovi	7		3		
NIVAKLE	6	1	6	9	
SELKNAM	1				
SIKUANI	10				
TEHUELCHÉ	2				
TOBA	24	5	27		12
WARAO	3				
YAMANA	3	1	2		1
YANOMANI	17			11	2
YARURO	10				
TOTAL	171	7	60	26	20



MOUNT PINATUBO, PHILIPPINES



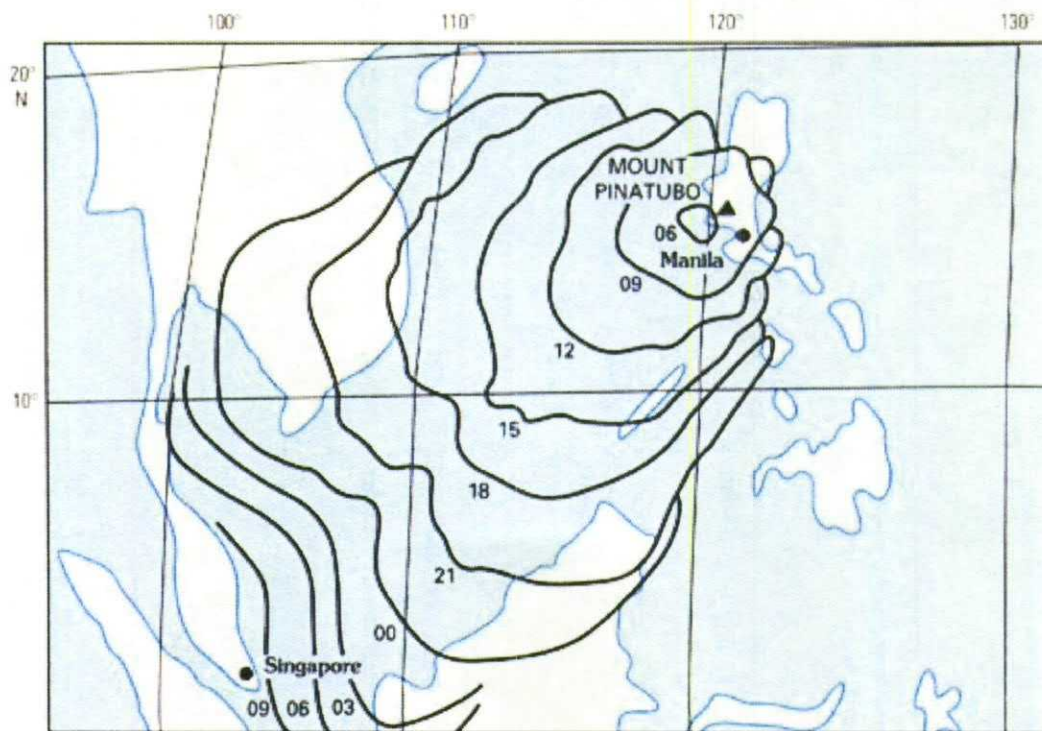
DARKNESS AND SKY FALL IN A PLINIAN ERUPTION



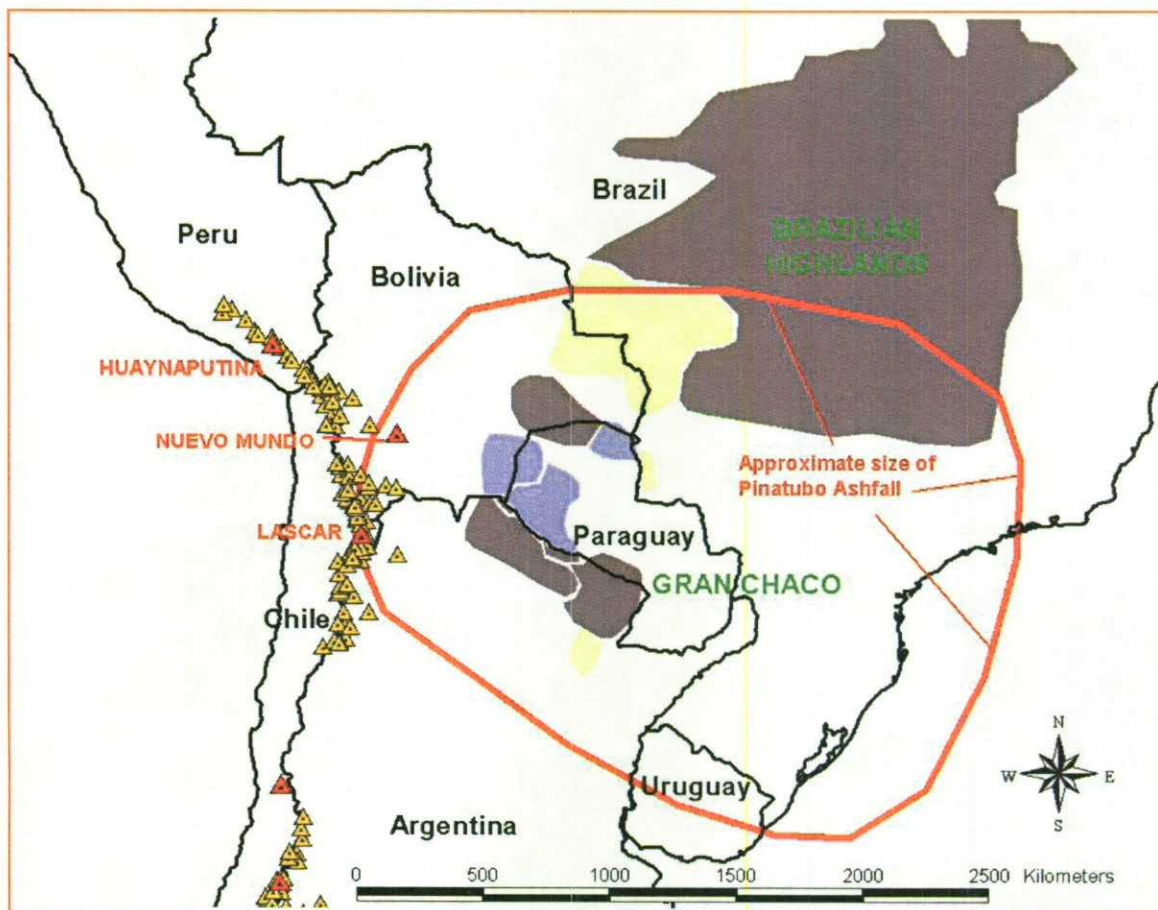
TWO VIEWS OF MOUNT PINATUBO ASH FALL



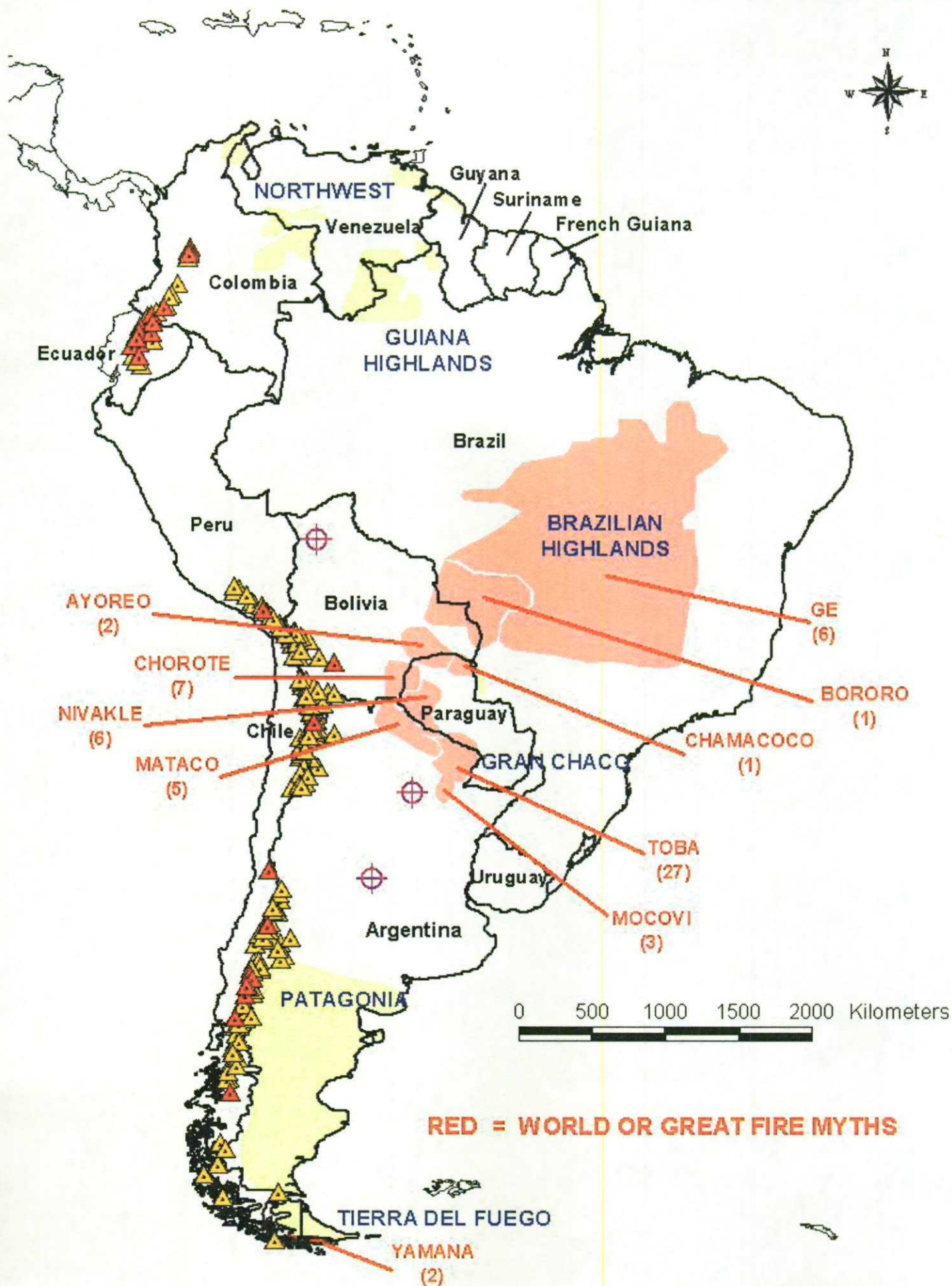




PINATUBO ASHFALL DISTRIBUTION AND TIMELINE BY 3-HOUR INCREMENTS.



COMPARISON OF PINATUBO ASHFALL EXTENT WITH GRAN CHACO PLINIAN VOLCANO "SKY FALL/DARNESS STORIES.

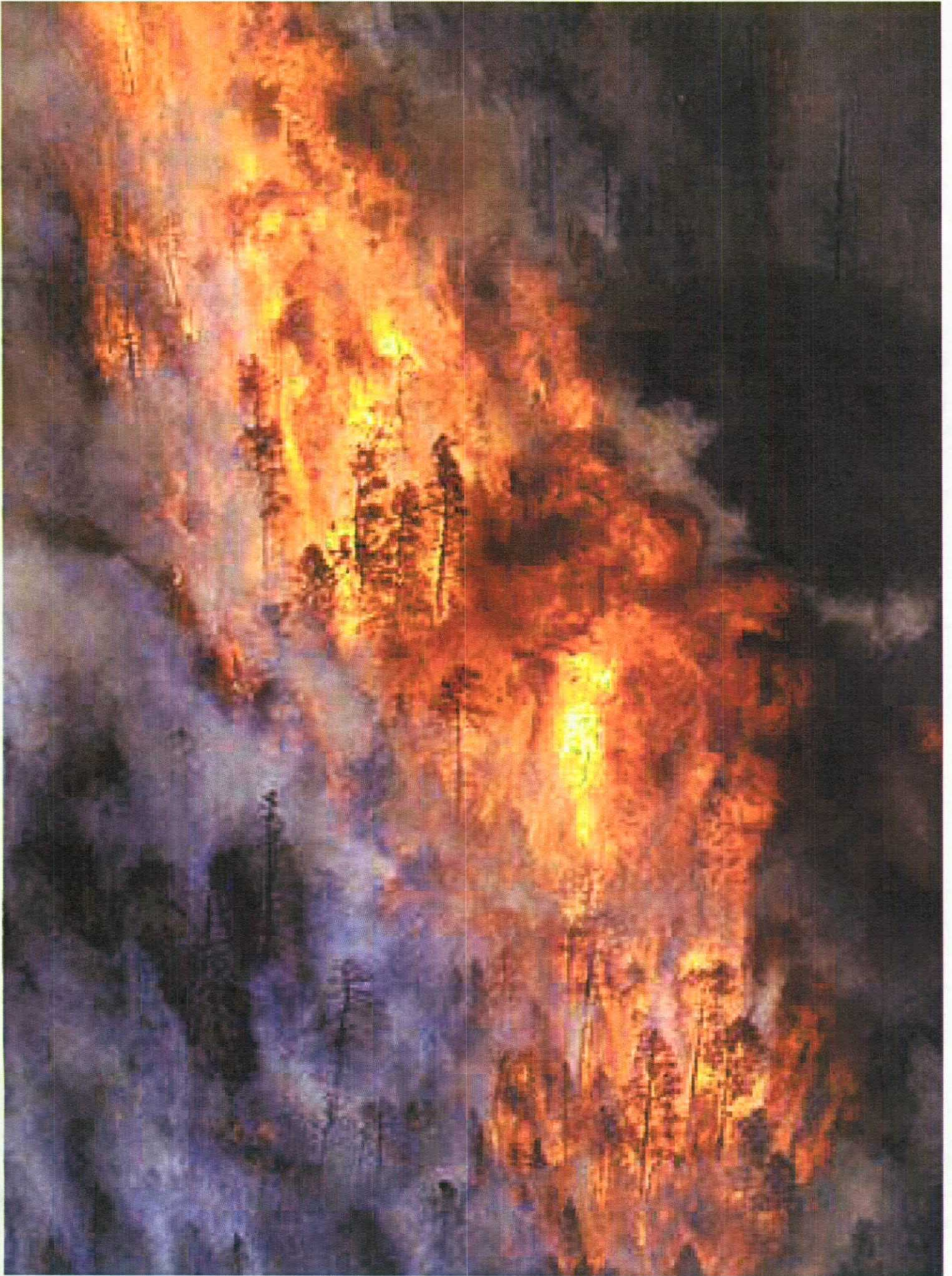


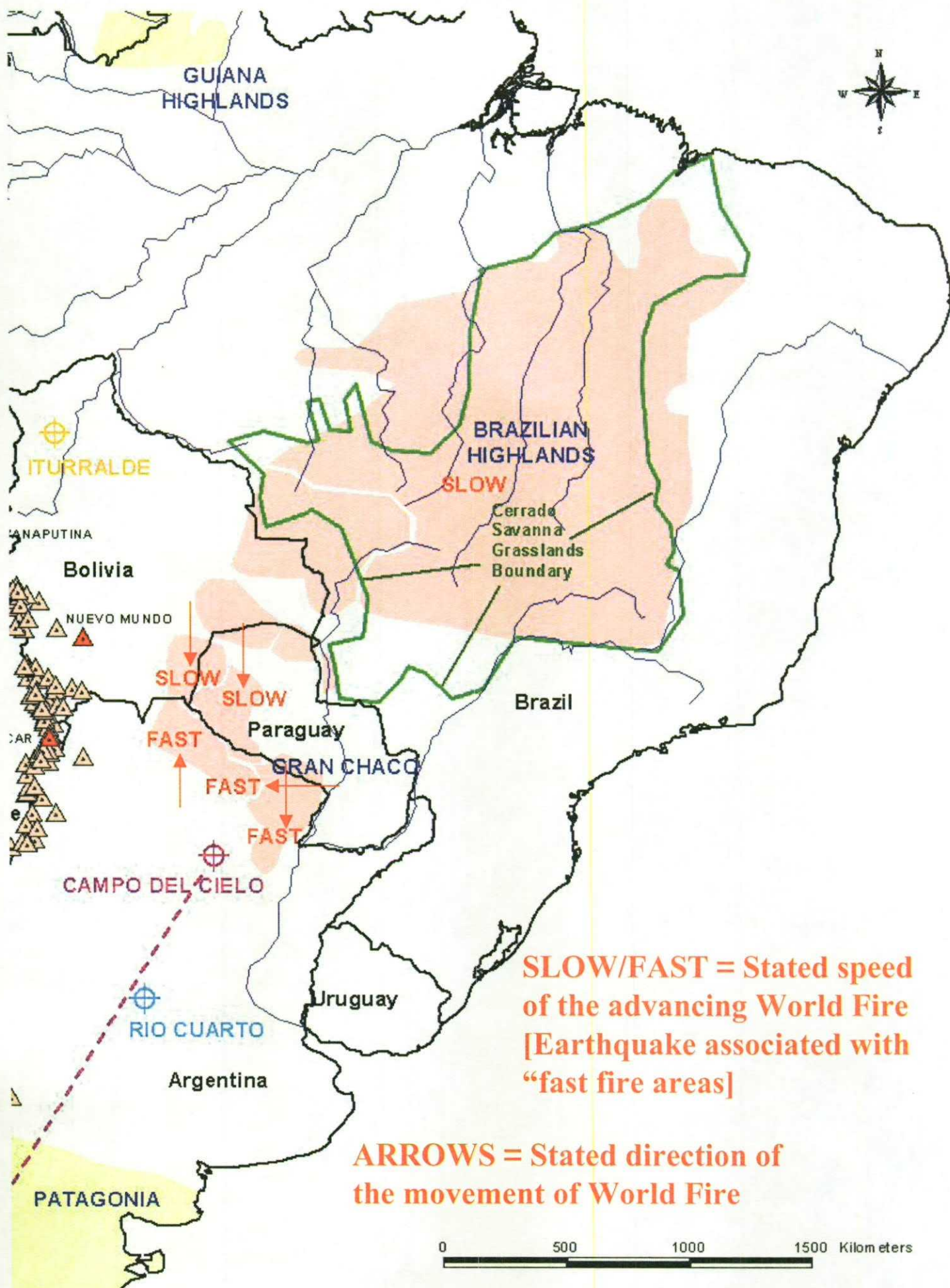


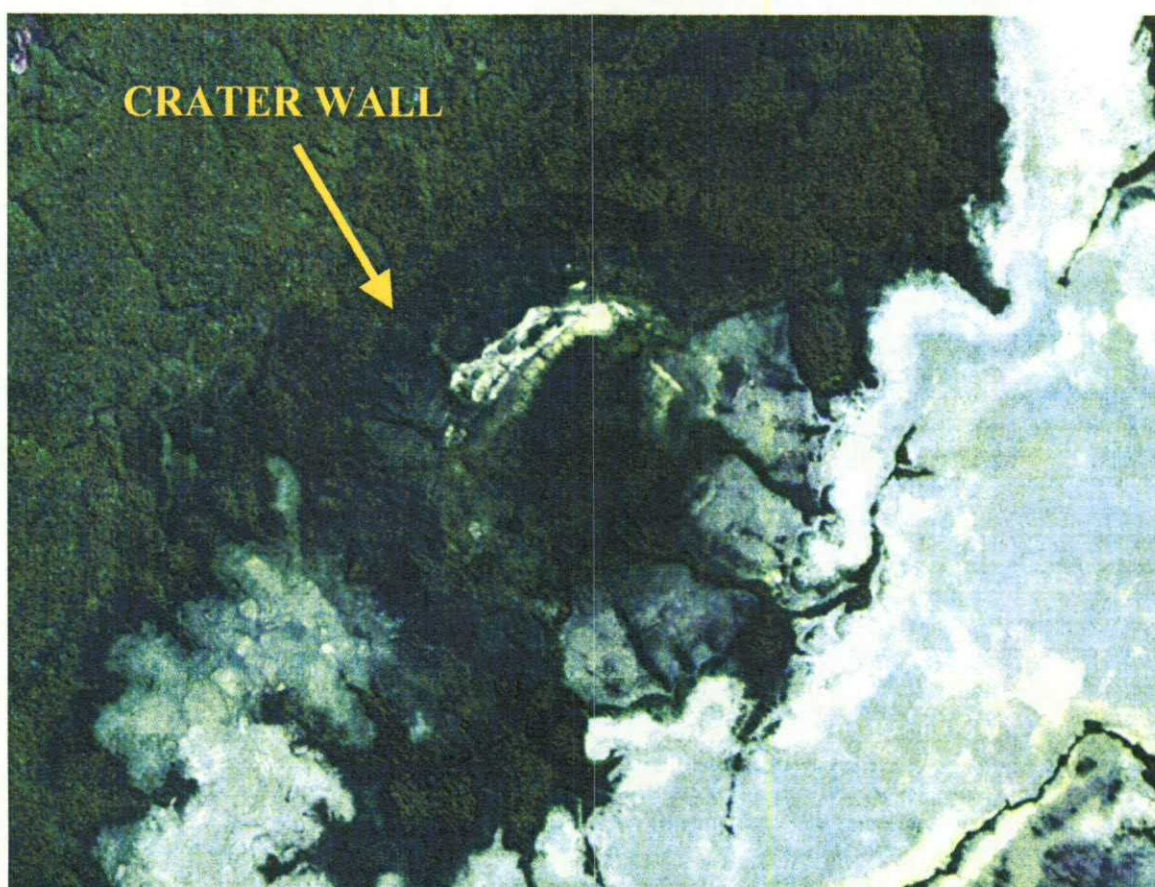
Brazil cerrado savanna.



Gran Chaco dryland forrest.







ARAONA CRATER, BOLIVIA
[ITURRALDE STRUCTURE]

nature

INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

Volume 355 No. 6357 16 January 1992 £3.00

TRAIL OF A BOUNCING METEORITE

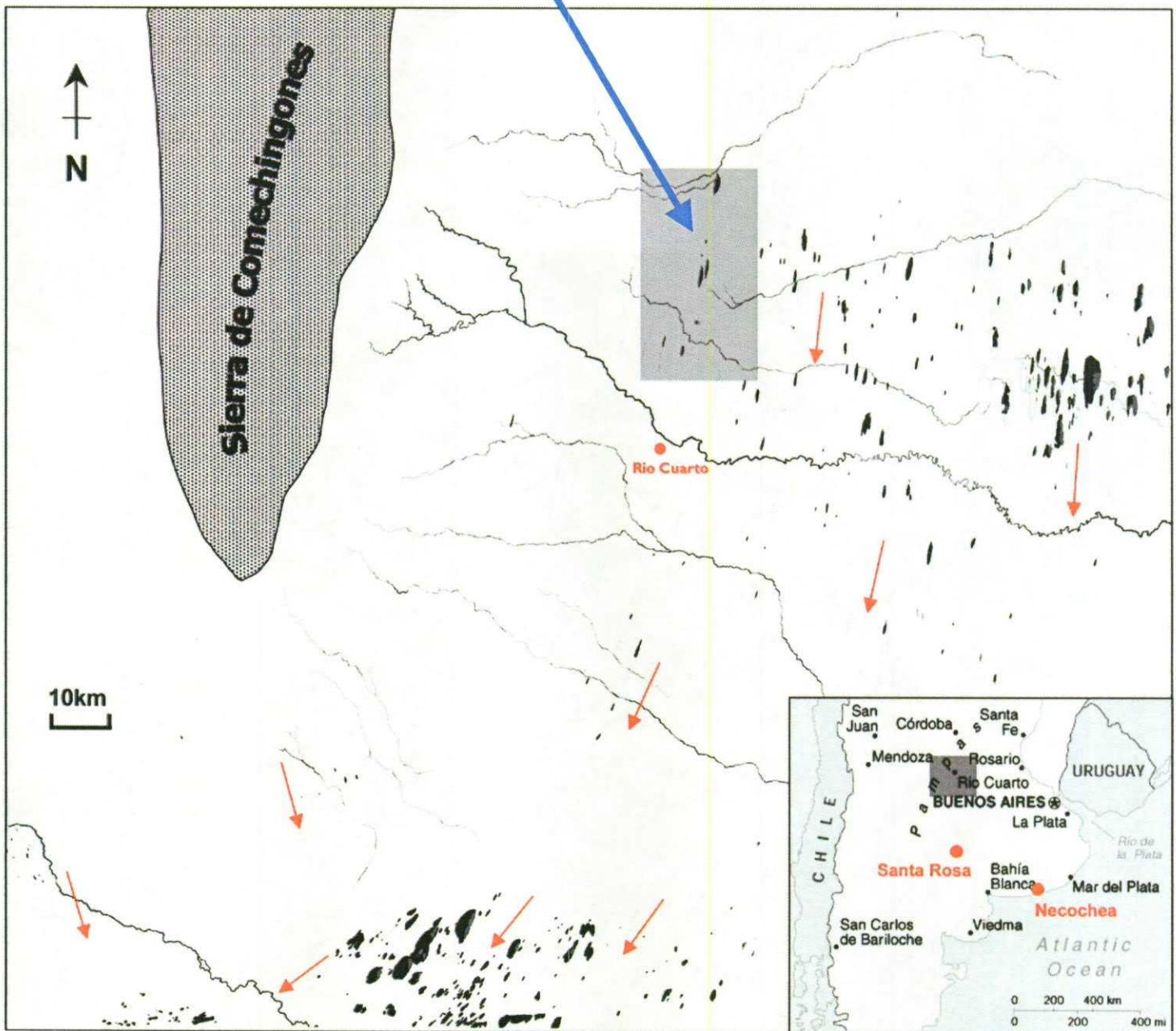
**Tit for tat in
animal populations**

**'Muscles' from
polymer gel**

BIOTECHNOLOGY
product review



Rio Cuarto “Crater Field”



Location of hypothesized Argentina Rio Cuarto “crater field” in relation to late Holocene dune blowout system.

[From Bland et al. 2002, *Science* 296:1110(Fig.2)]

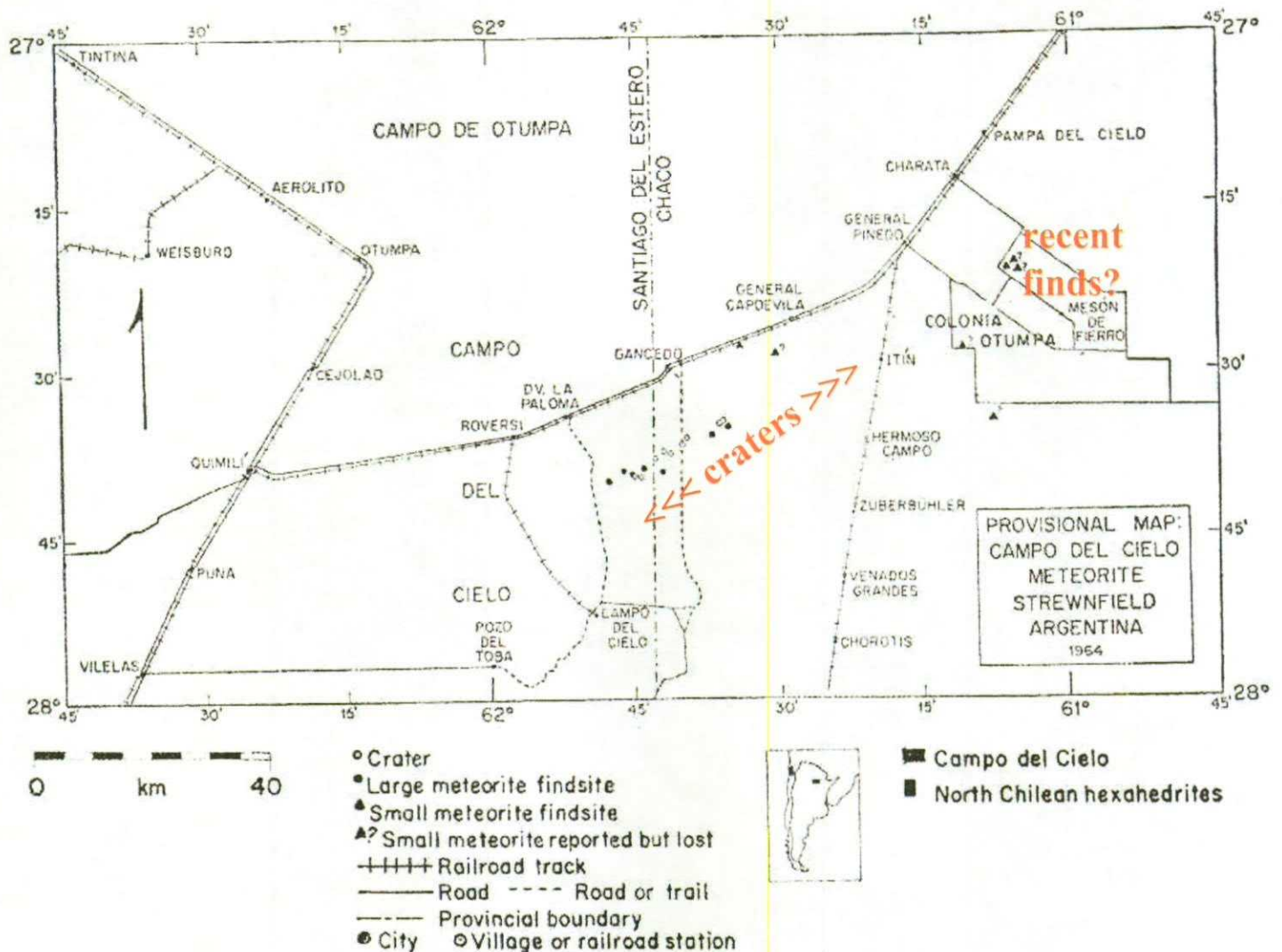


CAMPO DEL CIELO IMPACT CRATER, FORMED CA. 4000 BP



CAMPO DEL CIELO IRON METEORITE

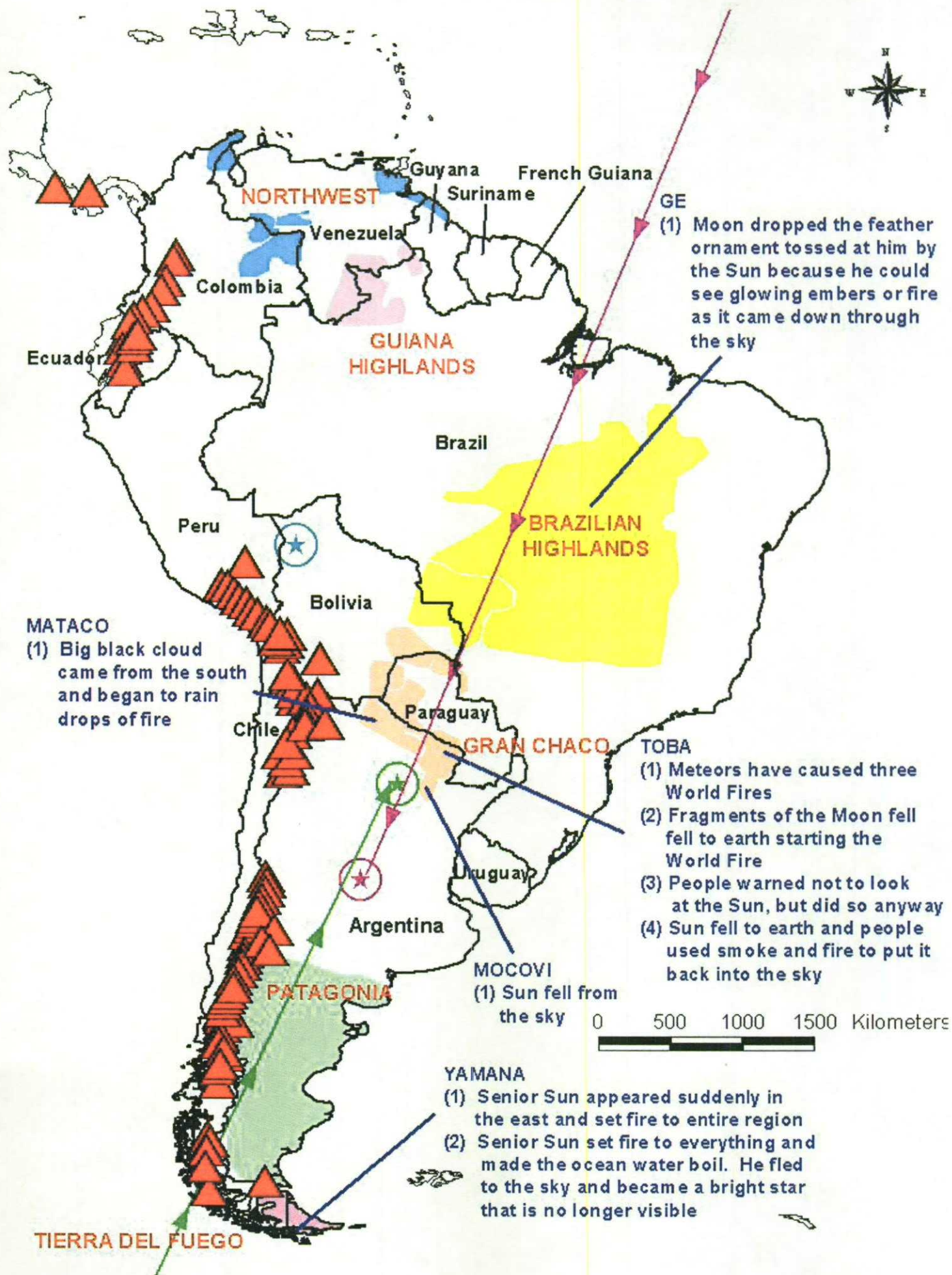
CAMPO DEL CIELO CRATERS AND STREWN FIELD



[FROM CASSIDY ET AL. 1965, SCIENCE 149:1056(FIG. 1)]

And there [Campo del Cielo] in the stories of the different tribes of their battles, passions and sacrifices, was born a beautiful, fantastic legend of the transfiguration of the meteorite on a certain day of the year into a marvelous tree, flaming up at the first rays of the sun with brilliant radiant lights and noises like one hundred bells, filling the air, the fields, and the woods with metallic sounds....

[Alvarez 1926, cited in Cassidy and Renard 1996]



CONCLUSIONS

- **Mythology can be rigorously crafted into a productive tool for the identification and study of major natural catastrophes during the Holocene.**
- **Based on these myths, a major ultra-plinian volcanic eruption, arguably from Nuevo Mundo Volcano, severely impacted cultures in the Gran Chaco during the late Holocene. One or two other major eruptions, presumably from presently unidentified volcanoes in Columbia, impacted cultures in northern South America.**
- **The Araona crater impact event and the hypothesized Rio Cuarto impact seemingly lack identifiable connections with regional mythologies.**
- **The Campo del Cielo meteorite impact can be reasonably linked with myths of the “World Fire” in the Gran Chaco, and possibly the Brazilian Highlands.**
- **If the Campo del Cielo impact caused a major mass fire, this fire may have contributed to aspects of worldwide climate change at that time.**
- **These and other hypotheses derived from the analysis of mythology can be quantified and tested for eventual confirmation through archaeology, paleoenvironmental studies, and other disciplines.**